Sandia National Laboratories

International Security News

International Security Programs
Dori Ellis, Director

Focus on Collaborative Research and Development – Part 2

From the Director

FOCUS

International Security Programs (ISP) research and development (R&D) collaborations with international partners, many of which have existed for a decade or more, have benefits beyond technology development. These collaborations also lay the foundation for developing trusting relationships, which are key to success in global cooperation. In fact, through these relationships, Sandia National Laboratories and the other national laboratories have been able to quickly develop combating terrorism collaboration in response to September 11, 2001. As a result of the recent discovery of the Iranian violations by the IAEA, the national labs are exploring opportunities to collaborate closely on developing new concepts for strengthening the Nonproliferation Treaty.

This issue of the International Security News is the second of a two-part series highlighting Sandia's international R&D collaborations. The first issue, published in February 2004, provided insights into our activities in Northeast Asia, South Asia, and the Middle East. This issue focuses on Sandia's R&D collaborations with Russia. Collaborations with the Russian nuclear weapons complex have existed for decades and span many topics, from basic science and technology to the worldwide battle against terrorism.

For the past ten years, the vast majority of the collaborations have been in a bilateral context. That is, Sandia scientists and engineers have been working

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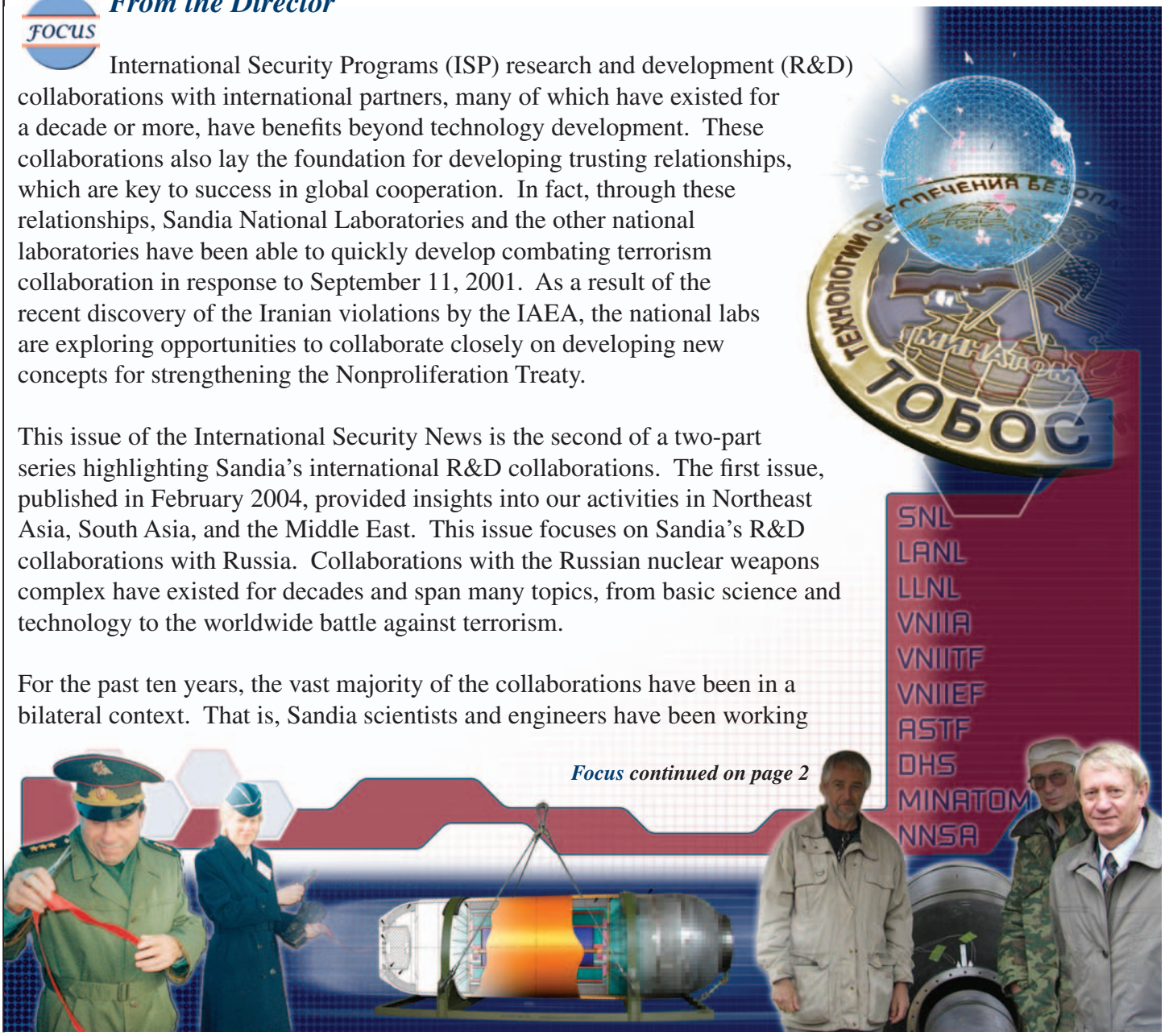

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with their Russian colleagues on a number of topics of mutual interest: warhead safety and security, advanced monitoring concepts for fissile material security, and novel nonweapons commercial enterprises that will provide alternative employment for weapons scientists and engineers.

In May 2004 the biennial US-Russian Lab Directors meeting will be held in Moscow. The directors of the six US and Russian nuclear weapons labs and the leadership of the National Nuclear Security Administration (NNSA) and the Russian Federal Agency of Atomic Energy (FAAE), formerly the Ministry of Atomic Energy (MINATOM), will meet to review current collaborations and to discuss new directions.[1] Undoubtedly, the bilateral collaborations will be deepened and broadened. Potential new initiatives in science, technology, combating terrorism, and nuclear energy will be explored. An important new dimension will be discussions of potential multilateral collaborations. These new multilateral collaborations would leverage the vast amount of knowledge developed by US-Russian cooperation into broader international challenges. In addition to new directions for the US-Russian collaborations, Sandia looks forward to supporting the emerging international R&D collaborations stimulated by Department of Homeland Security (DHS) initiatives. Priority countries for DHS include Canada, Mexico, Israel, Japan, the United Kingdom, and the European Union. As with the Russian collaborations, Sandia will be using our long-term relationships with these countries as the foundation for future R&D initiatives. We will report on these activities in the months ahead as new relationships are forged with key international partners.

Dori

[1] The leadership of Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratories (SNL) and NNSA From the US will meet with the Russian leadership of the All-Russian Scientific Research Institutes of Experimental Physics, Technical Physics, and Automatics (VNIIEF, VNIITF, VNIIA) and FAAE.

Focus on Collaborative Research and Development – Part 2

International Business Infrastructure

General Interest

Overcoming Impediments to US-Russian Cooperation on Nuclear Nonproliferation

William F. Burns, Major General (US Army, Retired)
and
Rose Gottemoeller, Senior Associate, Carnegie Endowment for International Peace

Burns and Gottemoeller represent the US as independent experts in nuclear nonproliferation on the Joint US-Russian Academies Committee on the nuclear nonproliferation project on Overcoming Impediments to Cooperation between the US and Russia on Nuclear Nonproliferation. *With funding from the Nuclear Threat Initiative, the committee convened a joint National Academies workshop held at the International Atomic Energy Agency in Vienna on September 22-23, 2003. Burns and Gottemoeller have summarized the workshop results in the following commentary. The viewpoints stated here may not necessarily coincide with official positions of the organizations with which they are affiliated.*

Even during the Cold War, Russians and Americans recognized their shared interest in preventing the spread of nuclear-weapons capabilities. In the last decade, the United States and the Russian Federation have pursued cooperative nuclear nonproliferation programs that focus primarily on securing nuclear materials and containing weapons and dual-use expertise and technology. This mission may be more important now than ever before. People across the world realize that more and smaller groups, including terrorist organizations and non-state actors, can overcome the hurdles to obtaining nuclear weapons. The so-called "nuclear club," comprising nations that have nuclear weapons, has expanded, and weapons programs in other nations have threatened to expand the club further. The awesome destructive power of nuclear weapons makes this situation one of special concern.

The United States and the Russian Federation are working closely together in many ways to address the threat of nuclear proliferation in order to enhance both their mutual security and the security of the international system. Barriers and impediments to US-Russian cooperation on controlling nuclear proliferation take many forms. Some result from differing political systems or are the residue of historic clashes between systems and cultures. Some are rooted in such mundane issues as differences in language or geographic location. Some spring from internal political issues that spill over into relations among states. Legal systems and bureaucratic procedures developed at one time for worthy purposes may work at cross-purposes to other equally worthy causes today.

In September 2003, the National Academies of the United States and the Russian Academy of Sciences held a workshop at the International Atomic Energy Agency to identify impediments to US-Russian cooperation on nuclear nonproliferation and strategies that these partners can use to address or overcome impediments. Prior to the meeting, the workshop chairs circulated background papers based on discussions with current and former government officials working in this arena.

First, workshop participants examined programs that are generally regarded as successful in overcoming impediments to cooperation. The key programs addressed were the Cooperative Threat Reduction (CTR) program; the Fissile Material Disposition program's Highly Enriched Uranium (HEU) Purchase Agreement, also called Megatons to Megawatts; the dismantlement of strategic ballistic missile submarines (SSBNs) under the Strategic Offensive Arms Elimination (SOAE) agreement; the Material Protection, Control, and Accounting (MPC&A) program funded by the US Department of Energy; export control programs; the Joint Verification Experiments; the International Science and Technology Center (ISTC); and the International Nuclear Safety Program (INSP). Aspects of these programs are held up as possible models for current and future projects, and features of these programs were discussed as strengths that should be emulated.

Participants in the workshop also discussed a number of weak points and impediments that hinder and

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even halt programs. An essential step in overcoming an impediment to cooperation is identifying and understanding the source of that impediment. Impediments were identified in terms of six kinds of issues:

1. *Political Issues.* The US has linked funding for some cooperative programs to actions outside the programs, such as US insistence that Russia cease all work with Iran on the Bushehr reactor project. Both American and Russian participants described difficulties within their respective governmental interagency processes. In addition, Russian officials have denied US access to Russian facilities to monitor how the funds are used and what results are achieved. Obtaining US entry visas for Russian nationals has become more difficult as visa policies have tightened under the USA PATRIOT Act.

2. *Legal Issues.* Several types of legal issues affecting the programs were discussed. For example, by agreement, donors and recipients of cooperative-program funds provided by the US government to Russia are tax exempt. However, problems remain, such as lack of a clear tax exemption mechanism for participants, lengthy bureaucratic procedures because of lack of capacity for review, and lack of a Russian federal law providing exemptions from regional taxes.

3. *Issues Related to Scientific and Technical Cooperation.* Russian participants cited the lack of US-Russian cooperation on promoting the peaceful use of nuclear energy as an impediment to more broad cooperation on nuclear nonproliferation. In addition, some US-Russian agreements have explicitly or implicitly required technical work that may not be scientifically feasible.

4. *Issues Related to Program Organization and Management.* If the goals of a cooperative program or specific programmatic procedures are in tension or conflict with established bureaucratic approaches, progress may be delayed, operations may be halted, or funding may be put at risk. The result can be seen by partners as evidence of a lack of commitment to cooperative efforts. Travel authorizations and other bureaucratic procedures become obstacles because of the necessity to obtain permission or approval from several agencies. US participants noted that the US lacks institutionalized mechanisms for evaluating and learning from experience to improve cooperative programs. In addition, turnover in US personnel has required Russian partners to work with a different counterpart in the same program nearly every year.

5. *Issues Related to the Legacy of the Cold War Mentality.* Personal attitudes and relationships can be critically important, and residual Cold War animosity, stereotypes, and mistrust can undermine cooperative efforts. Cold War attitudes may take the form of explicit or implicit disrespect or mistrust, causing unnecessary tension during negotiations, delaying or eliminating funding, and hindering efforts to establish effective arrangements.

6. *Funding Issues.* The United States provides nearly all the funding for bilateral US-Russian cooperative programs on nuclear nonproliferation, although Russia has pledged two billion of its own dollars for work in Russia over the next 10 years. The US preference for funding large research centers in the lab-to-lab cooperative programs neglects smaller institutes. Russians have found it time-consuming to get approval for funding through the attractive alternative funding mechanisms, such as ISTC, that provide relief from tax problems and other difficulties. The US

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Congress does not readily support programs, such as the "brain drain" programs, that are not easily quantifiable.

The US and Russian governments have succeeded in coping with these barriers and impediments to nonproliferation cooperation over the past decade, but it is clear that they have found no single solution. With some impediments, it has been possible to bump along, continuing–albeit with difficulty– project implementation. In other cases, impediments have stopped the cooperation cold.

Characteristics that improve a program's chances for success include specific program goals, agreed to by both sides; an agreed list of specific actions representing attainment of program goals; links between funding and the agreed upon goals and actions; and an agreed plan for transfer of project and funding responsibility from the US to Russia. However, these characteristics are not sufficient to guarantee program success. Workshop participants described the experiences and lessons of cooperation and identified opportunities, strategies, tools, and resources that may be helpful in overcoming impediments.

1. *Mechanisms for Interaction at Multiple Levels.* Some participants argued that nuclear nonproliferation efforts are often most effectively addressed in the context of the international community, such as the G8 and NPT frameworks. In particular, shared responsibility can reduce project risks due to bilateral relations and financial circumstances. Russian participants suggested that cooperative programs have a better chance of success if major goals, subject scope, organization, and management issues are discussed and established in government-to-government agreements. Both Russian and American participants noted that joint coordinating committees provide a high-level mechanism for making decisions and addressing problems. Agreements between implementing agencies of both countries are also vital to successful cooperation. In addition, a key to the success of manager-to-manager relations across programs has been the maintenance of small, consistent project teams. Some programs have devised mechanisms for encouraging communication that promotes effective information sharing and coordination. Participants have found the candid interactions at informal meetings to be beneficial. Finally, some participants suggested that the education and training of the next generation of specialists and managers through student exchanges could contribute to the effectiveness of interactions and cooperation in solving nuclear nonproliferation issues.

2. *International Cooperation on Proliferation-Resistant Nuclear Energy.* Russian participants heavily emphasized the potential role of cooperation in facilitating the adoption of commercial nuclear energy in ways that strengthen rather than weaken the international nuclear nonproliferation regime.

3. *Changes in National Law, Policy, or Procedures.* Pursuit of new laws can be difficult and time-consuming. US legislative activity has been focused on providing authorization and appropriations for the programs. Procedures, such as those for review of entry visas, or regulations can be changed without changes in law.

4. *Mechanisms for Disseminating the Benefits of Experience.* A multiprogram effort, such as MPC&A, will be most effective when the people involved in specific programs are aware of the situation in other programs and how their work relates to the overall effort. Substantial benefit may be derived from establishing a

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unified program evaluation system that is transparent to program participants.

5. *Other Tools or Fixes.* Exemption and waiver systems could help address the types of bureaucratic roadblocks that are inevitable in a collaboration such as this one, providing the opportunity to solve immediate problems without having to wait until their more fundamental causes have been addressed. Ad hoc arrangements in the early programs arose out of the necessity of getting work done despite the lack of agreements; nevertheless, ad hoc arrangements must not be abandoned altogether. At times, intervention from an individual willing to take responsibility might be necessary to accomplish an urgent project goal.

The informal setting of the workshop, free of explicit negotiation instructions from the respective governments, laid the foundation for a fruitful, informative discussion. Many participants proposed following up the workshop with a specific joint study within the framework of the Joint Committee on US-Russian Cooperation on Nuclear Nonproliferation. The achievements of the workshop bode well for the future of cooperation between the United States and the Russian Federation on nuclear nonproliferation.

Major General William F. Burns (US Army, retired) has served at the side of presidents as his nation's top military advisor, negotiator, and policy shaper in matters pertaining to arms control and disarmament. His duties have taken him to Vietnam, Russia, Germany, China, Japan, Switzerland, and many other parts of the world. In 1988, Burns retired as a major general to accept appointment as the ninth director of the US Arms Control and Disarmament Agency. Since retiring from government service in March 1993, Burns has served as president of the Army War College Foundation, on the Board of Trustees of La Salle University, and on the Advisory Council of the Woodrow Wilson School, Princeton University.

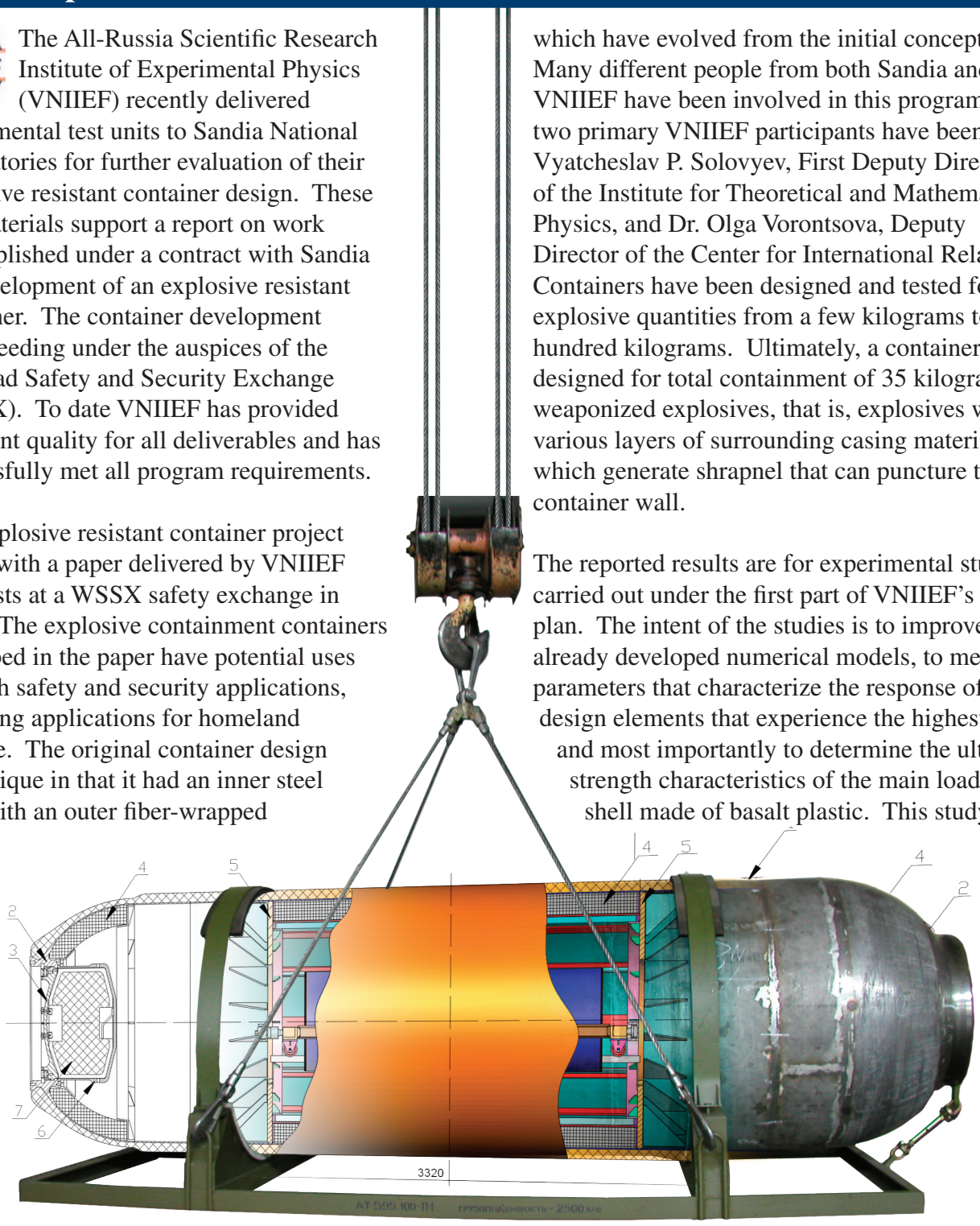
Rose Gottemoeller specializes in national security issues, particularly relating to Russia and Eurasia. Gottemoeller's research at the Carnegie Endowment for International Peace focuses on issues of nuclear security and stability flowing from the breakup of the Soviet Union and problems in the nonproliferation regime. Before joining the Endowment in October 2000, Gottemoeller was deputy undersecretary for defense nuclear nonproliferation in the US Department of Energy. In 1999 and 2000, she served as the department's assistant secretary for nonproliferation and national security. Prior to her Energy Department work, Gottemoeller served from 1994 to 1997 as deputy director of the International Institute for Strategic Studies in London. From 1993 to 1994, she served in the National Security Council at the White House as director for Russia, Ukraine, and Eurasia Affairs. Previously, she was a senior defense analyst at RAND, a Council on Foreign Relations fellow, and an adjunct professor of Soviet military policy at Georgetown University. She is currently an adjunct professor teaching on Eurasian security at Georgetown University.

Opinions expressed by Guest Editors are not necessarily the opinions of Sandia National Laboratories.

AT595 Explosive Resistant Container Tests

The All-Russia Scientific Research Institute of Experimental Physics (VNIIEF) recently delivered experimental test units to Sandia National Laboratories for further evaluation of their explosive resistant container design. These test materials support a report on work accomplished under a contract with Sandia for development of an explosive resistant container. The container development is proceeding under the auspices of the Warhead Safety and Security Exchange (WSSX). To date VNIIEF has provided excellent quality for all deliverables and has successfully met all program requirements.

The explosive resistant container project began with a paper delivered by VNIIEF scientists at a WSSX safety exchange in 1994. The explosive containment containers described in the paper have potential uses for both safety and security applications, including applications for homeland defense. The original container design was unique in that it had an inner steel liner with an outer fiber-wrapped liner. The design provides total containment of an explosive detonation and is significantly lighter and safer than conventional containers.



An ongoing exchange since the initial presentation in 1994 led to various studies and container designs, which have evolved from the initial concept. Many different people from both Sandia and VNIIEF have been involved in this program. The two primary VNIIEF participants have been Dr. Vyatcheslav P. Solovyev, First Deputy Director of the Institute for Theoretical and Mathematical Physics, and Dr. Olga Vorontsova, Deputy Director of the Center for International Relations. Containers have been designed and tested for high explosive quantities from a few kilograms to a few hundred kilograms. Ultimately, a container was designed for total containment of 35 kilograms of weaponized explosives, that is, explosives with various layers of surrounding casing materials, which generate shrapnel that can puncture the container wall.

The reported results are for experimental studies carried out under the first part of VNIIEF's test plan. The intent of the studies is to improve the already developed numerical models, to measure parameters that characterize the response of the design elements that experience the highest load, and most importantly to determine the ultimate strength characteristics of the main load-bearing shell made of basalt plastic. This study was necessary in order to predict the strength margin of the container under development.

Jointly developed requirements demand that the container completely contain detonation products from

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US-Russian Collaboration on Counterterrorism: A Progress Report

In April 2003 Sandia National Laboratories' International Security Center hosted experts from the US and Russian weapons laboratories in a third meeting on the subject *Science and Engineering Issues Related to Detection of Radioactive and Explosive Hazardous Materials* (See "US-Russian Collaboration on Counterterrorism: Historical Perspective" on page 10). This meeting had three objectives:

1. To report on long-range implementation plans for each technical focus area
2. To prioritize future collaborative technical projects within each focus area
3. To demonstrate selected US national laboratory counterterrorism-related technologies

Conducted under the auspices of the US-Russia Warhead Safety and Security Exchange, this US-Russia collaboration consists of three focus areas, organized as contact groups. Contact Group 1, Threat Assessment and Analysis, is conducting systems studies and modeling to characterize the terrorist threat. Contact Group 2, Detection and Prevention, is developing the next generation of technologies to detect nuclear, radioactive, and explosive materials or to prevent their use in a terrorist act. Contact Group 3, Response and Recovery, is developing innovative technologies to rapidly respond to and mitigate the effects of a terrorist act.

Some of the technologies that are under development in this collaborative effort are

- *Nuclear threat studies* – development and precursor analysis of scenarios involving the use of radiological dispersion devices (RDD) in Russia and the other countries in the FSU
- *Enhanced detection systems* – development and testing of new active and passive systems to detect radioactive or explosive materials in air cargo containers, sea-land containers, and luggage
- *Explosion-resistant containers* – development and testing of containers that can withstand the detonation forces of up to 20 kilograms of high explosives for rapid response to the scene of an incident
- *RDD characterization and mitigation techniques* – testing of RDD simulants to determine the most appropriate mitigation techniques, assuming a detonation cannot be prevented

Existing technologies from each US national laboratory were demonstrated for the Russian attendees. In addition, a poster session highlighted numerous other US activities underway in the area of counterterrorism technology development.

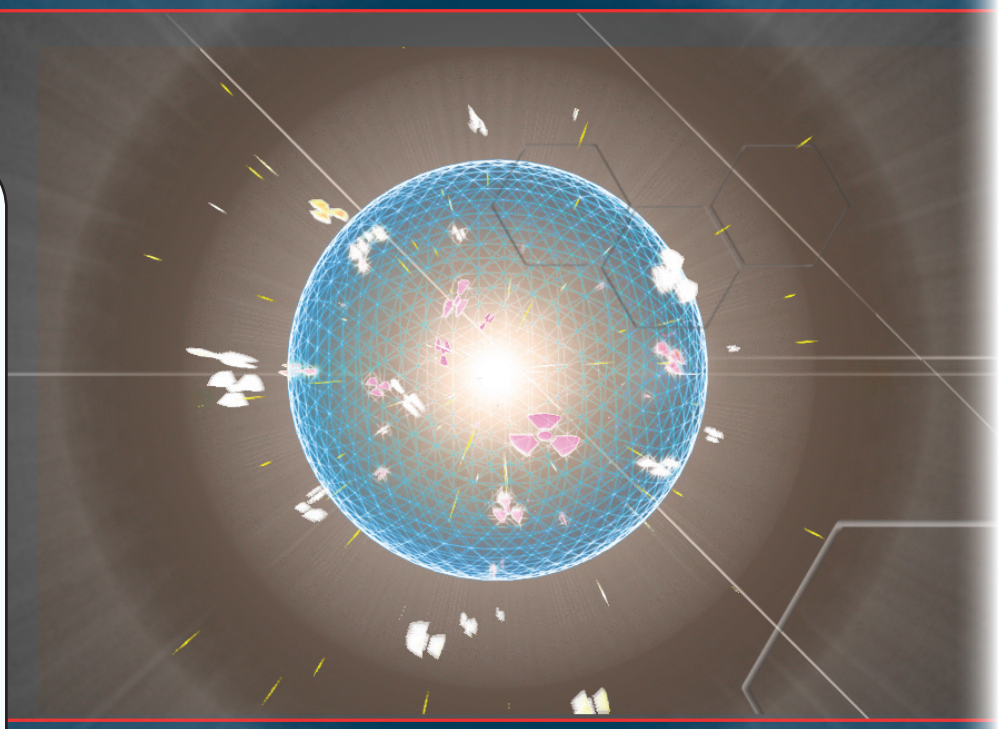
The next step in US collaboration with Russia is to conduct joint testing of these technologies for each side's end-user communities. The US and Russia continue to work with end-user communities to define those technology development needs and milestones that best serve our mutual goals in combating terrorism. Source: Joe Saloio 6927, MS 1374, 505-845-3067, fax 505-844-8119, jhsaloi@sandia.gov

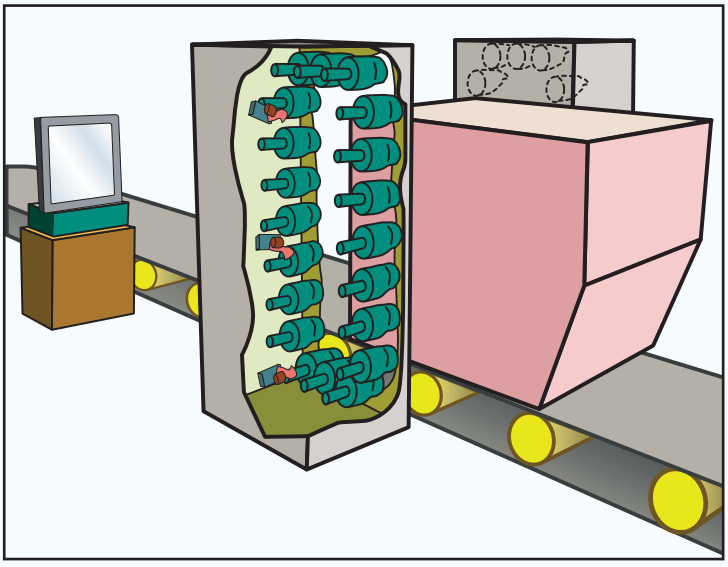
Explosive Resistant Container

Sandia is working with the All-Russia Scientific Research Institute of Experimental Physics (VNIIEF) to develop explosion resistant containers to withstand the detonation forces and contain the gaseous by-products of potential terrorist devices. In December 2003, VNIIEF delivered to Sandia a prototype container capable of withstanding the detonation of 8 kilograms of high explosives (HE). Higher capacity containers are planned, as well as containers with advanced venting capabilities.

RDD Mitigation

Sandia is working with the All-Russia Scientific Research Institute of Technical Physics (VNIITF) and VNIIEF to test various rapidly-deployable materials and technologies to mitigate the dispersion effects of a radiological dispersion device (RDD). As part of this effort, VNIITF and VNIIEF are conducting field tests and developing models to identify the best mitigation techniques under various conditions.





Cargo Tomography

Sandia is collaborating with the All-Russia Scientific Research Institute of Automatics (VNIIA) to develop a neutron interrogation system to identify and image explosives concealed in air cargo containers, sea-land containers, and passenger luggage. This innovative technology utilizes neutron and gamma time-of-flight measurements coupled with neutron directional discrimination that utilizes alpha detection from the D-T reaction in the neutron generator. This project is in the first prototype design phase, with testing planned for June 2004.

US-Russian Collaboration on Counterterrorism: Historical Framework

As a result of various devastating terror attacks against the United States and Russia, our nations have become increasingly concerned about the possibility of catastrophic nuclear assault by terrorists. Consequently our governments have directed US and Russian scientists and engineers to explore cooperative efforts in developing technologies that could be brought to bear to better protect the world against such attacks.

In April 2002, laboratory directors and other representatives of US weapons laboratories and Russian weapons facilities met in Santa Fe, New Mexico, to review the first ten years of scientific collaboration and to set the direction for the next several years. In light of the worldwide concern about the threat of terrorism, the directors initiated a series of workshops to explore the opportunities for scientific collaboration in combating terrorism. Areas of cooperation would be explored "to establish a baseline of detection requirements that would drive the development of detection capabilities under US-Russian collaborative efforts."

The first workshop, titled Science and Engineering Issues Related to Detection of Radioactive and Explosive Hazardous Materials, was held in June 2002 at the All-Russia Scientific Research Institute of Automatics (VNIIA) in Moscow. (See "VNIIA Hosts US-Russia Counterterrorism Workshop," International Security News, October 2002.) Conclusions reached at the June workshop were

1. The need is urgent to advance the science and engineering as well as the instrumentation and methodologies to counter the terrorist threat.
2. The identification of the characteristics of radioactive and explosive materials that could be used by terrorists and the subsequent development of test parameters for detection technologies based on end-user needs is a difficult and complex objective.

A follow-on meeting was held at the Marriott Grand Hotel in Moscow on November 18 and 19, 2002. This meeting had originally been planned for October in Albuquerque but was convened in Moscow because of difficulties with travel arrangements. The objectives of the meeting were

1. To provide an update on US programs and priorities to support operational users
2. To obtain an update on contact group activities
3. To establish Russia and US consensus on key challenges and priorities
4. To discuss an approach for developing a strategic plan for scientific and technical support for counterterrorism collaboration
5. To reach consensus on priorities for contact group proposals
6. To obtain an update on US Warhead Safety and Security Exchange (WSSX) counterterrorism plans for 2003
7. To agree on plans for a spring workshop to be held at Sandia National Laboratories in Albuquerque, New Mexico, in 2003

US participants included representatives of NNSA, DOD, Sandia National Laboratories, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, the DOE-Moscow Office, Office of Environment, Science, and Technology, and the US Customs Service. Russian attendees included representatives from MINATOM, MOD, the State Customs Committee, VNIIEF, VNIITF, and VNIIA.

Russia State Customs presented a proposal expressing the needs of the user community for a test bed that could be used for equipment certification. Seventeen other presentations provided details for proposal outlines provided prior to the meeting. The attendees discussed the US and Russian proposals, identified areas of mutual interest, and prioritized areas for further joint development by each of the contact groups.

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Collaboration Historical Framework ***continued from page 10***

The steering group agreed to the following conclusions:

1. Russia and the US reiterated their commitment to collaboration on counterterrorism technology and agreed that their cooperation is very important to both governments.
2. Broad areas of mutual interest and capabilities exist within the NNSA laboratories and the MINATOM institutes regarding development of analytical tools and technologies to combat terrorism.
3. Including the needs of the user community in the earliest phases of technology development is very important. Discussing the requirements for and operating conditions under which technology will be deployed strongly influences the ultimate effect of the systems.
4. The areas for further cooperation were categorized.
5. The contact groups will review and integrate the US proposals into the Russian work plan and prioritize them appropriately.
6. One specific proposal "A Certification Testing Laboratory Equipped with State Standard (GOST) Radiation Sources" was of special interest to both sides. Additional information was provided and will be the basis for further project development. The participants agreed to assign a small group to clarify objectives and approach and also to address the possibilities for near-term funding.

See "US-Russian Collaboration on Counterterrorism: A Progress Report" (page 8) for a discussion of the third workshop, which was held in April 2003 in conjunction with the International Security Conference sponsored by Sandia National Laboratories. Source: Bob Huelskamp 6927, MS 1374, 505-844-0496, fax 505-844-8119, rmhuels@sandia.gov

Explosive Container Tests ***continued from page 7***

eight kilograms of TNT-equivalent high explosive encased in 35 kilograms of inert surrounding material. VNIIEF was able to perform this stage of the work more quickly and economically by carrying out the tests with scaled open cylinder test units that imitate the central section of the container's load-bearing shell and with scale models of the cylindrical part of the container. Elements of the cylindrical part imitate the load-bearing layer, shrapnel protection layer, and end cap throttle elements of the container. Each test unit was loaded with a high explosive mass, which was chosen to imitate the explosive load on the actual AT595 container. After the tests, each unit was examined and photographed. The damage was characterized and its dimensions were measured. Overtests demonstrated that the units would not have experienced any gas or material leakage, even under extreme conditions.

VNIIEF's report presents experimental data on the entire scope of completed tests, their experimental arrangements, measured parameters, and measurement techniques as well as a discussion of the test results. Numerical simulation capabilities for the explosive loading phenomena under study and the test unit response are analyzed also. The current results provide analytic and experimental validation of the container design capabilities. The final validation will be the actual explosive testing of two containers, scheduled for spring 2004. One container will be tested at the eight-kilogram design level, and the second will be overtested to better determine the design safety margin. Source: Richard Smith 6928, MS 1374, 505-844-4476, fax 505-284-9088, resmith@sandia.gov

Leveraging the Defense Programs Investment in Russia through WSME

The story of the Warhead Storage Monitoring Experiment (WSME) is one of successful collaboration between Sandia National Laboratories' International Security Center and the All-Russia Scientific Research Institute of Automatics (VNIIA) International Programs Office. Under the Auspices of the Warhead Safety and Security Exchange (WSSX) Program and the sponsorship of the National Nuclear Security Administration's Defense Programs (NNSA/NA-10) and Russia's Ministries of Atomic Energy (MINATOM) and Defense (MOD), the Sandia/VNIIA team formulated a multiyear, multiphased initiative aimed at enhancing nuclear warhead security in Russia.

Over the past five years, the WSME project has grown from a paper study into a sustained and productive research and development effort, beginning with modest funding and developing into a high-priority program. The modest NNSA/NA-10 investment of approximately $1.2 million since 1998 has so far resulted in a solid record of technical accomplishments with direct impacts on the security of warheads in the Russian Federation. Note should be taken of the visionary leadership of NNSA's Helmut Filacchione in sponsoring the WSME project. As the project has progressed, the technical solutions developed through WSME have demonstrated the ability to have a major impact on improving warhead security. Additionally, during the course of the WSME project, the Russian and US project teams have established close relationships, developed a common understanding of the complexities of warhead security monitoring, and spawned successful spin-off projects.

From the outset of Phase I, adoption of WSME's technical solutions by the Russian MOD was considered a critical requirement for long-term success. The initial design team, led by John Kane of Sandia and German Smirnov of VNIIA, emphasized improving the security of Russian nuclear warheads through the adoption of an advanced security monitoring and inventory system based exclusively on Russian technologies. The MOD insisted on Russian-developed hardware and software, out of concerns for security, for readily available logistical support, and on the general principle of developing a Russian solution to a Russian challenge.

In Phase II (fiscal year 1999), the WSME partners developed the Storage Technology Demonstration Facility (STDF) in Moscow. The STDF began as a modest building in considerable disrepair but was refurbished to simulate the normal functions of an operational MOD weapon storage and maintenance facility.

The VNIIA team assembled a suite of technologies, including cameras, radiation detectors, magnetic door sensors, proximity card readers, video identification systems, tamper indicating devices, and Container Control Units, designed to provide continuous accounting and uninterrupted confidence in the security status of each warhead container. The monitoring equipment was integrated via unique software, enabling concurrent on-site and remote monitoring of the status of warheads in storage. The integrated system became known as the Advanced Monitoring and Inventory System (AMIS).

MOD's requirement for testing the AMIS system's effectiveness and supportability at an MOD site led the WSME project team to conceptualize the AMIS field test program TOBOS (Russian acronym for Safety and Security Technologies for Russian Warheads). This WSME spin-off was launched as a robust Sandia/VNIIA operational test and evaluation project under the sponsorship of the MOD and the Defense Threat Reduction Agency of the US Department of Defense. A new member of the team, the MOD's Weapon Safety and Security Research Technology Center (NITs/BTS), was added to ensure close compliance with MOD requirements.

In WSME Phase III, encompassing fiscal years 2001 and 2002, the team concentrated on testing, fixing, and retesting AMIS. During this phase, the project team

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TOBOS: Safety and Security Technology for Russian Warheads

TOBOS (the Russian acronym for Safety and Security Technologies for Russian Warheads) is the field-testing program for safety, security, and monitoring technologies. These tests will be conducted at the recently constructed Model Test Site near St. Petersburg, Russia, using routine MOD procedures in normal operational and storage environments. Additional testing will evaluate the performance of the Russian-developed inventory and warhead container security monitoring systems during transport under extreme environmental conditions, varied accident environments, and threat environments.

VNIIA and Sandia are developing the test program, with the MOD approving all test plans and test operations at MOD facilities. VNIIA will be the systems integrator for field testing the array of safety, security, and monitoring technologies used in MOD storage facilities and on warhead containers during transport. VNIIA will also evaluate and recommend an array of technologies, including tamper-indicating equipment, radiation monitors, container content identification devices, location technologies, and information protection technologies for use by the MOD 12th Main Directorate.

TOBOS is a high priority program within the Technology Development Directorate of the Defense Threat Reduction Agency, with the scope of the program expanding to include the investigation of Russian-proposed antiterrorism technologies. The TOBOS team achieved a critical milestone for enhancing Russian warhead security with the Russian advanced monitoring technologies test facility. The US and Russian military sponsors heralded the completion of the test facility as being more than a critical milestone in the TOBOS program but also a concrete example of the shared commitment to nonproliferation. Dignitaries from DOD and MOD recognized the exceptional contribution of the SNL/VNIIA team at a ribbon cutting ceremony in St. Petersburg, Russia, on October 20, 2003. Source: Bob Huelskamp 6927, MS 1374, 505-844-0496, fax 505-844-8119, rmhuels@sandia.gov

Leveraging through WSME continued from page 12

also addressed the complex challenges of the inventory and security monitoring of nuclear warheads during transit. The WSME research and development effort branched into two separate initiatives using the AMIS technology: AMIS-storage and AMIS-transport. The aim of the AMIS-transport effort was to provide MOD with continuity of knowledge on warhead accounting and security from the time a container is removed from one facility, placed on a truck or railcar and moved hundreds of kilometers, and received into another facility for storage. This system is designed to provide continuous information on the status of warheads and confidence that the containers have not been opened or tampered.

During fiscal years 2002 and 2003, the fourth phase of the WSME project concentrated on the transportation security monitoring issue. Technical specialists at VNIIA built an AMIS-transport test bed on a standard Kamaz military truck. Each of the requisite functional requirements in the storage vault was adapted to the truck test bed to include using the truck's power supply.

A prominent MOD official summed up his estimation of WSME's benefits at the spring 2003 meeting of the WSSX Joint Steering Committee:

These projects are taken very seriously by MOD, and they have a great future. They are trailblazers for further development of advanced technologies for monitoring nuclear warheads. We are on the right track.

General Starodubtsev
Chief Engineer, 12th Main Directorate

During Phase IV, the spin-off TOBOS program began to make substantial progress as an independent effort with the ground breaking and commissioning of the Model Test Site storage facility, located on a NITs/

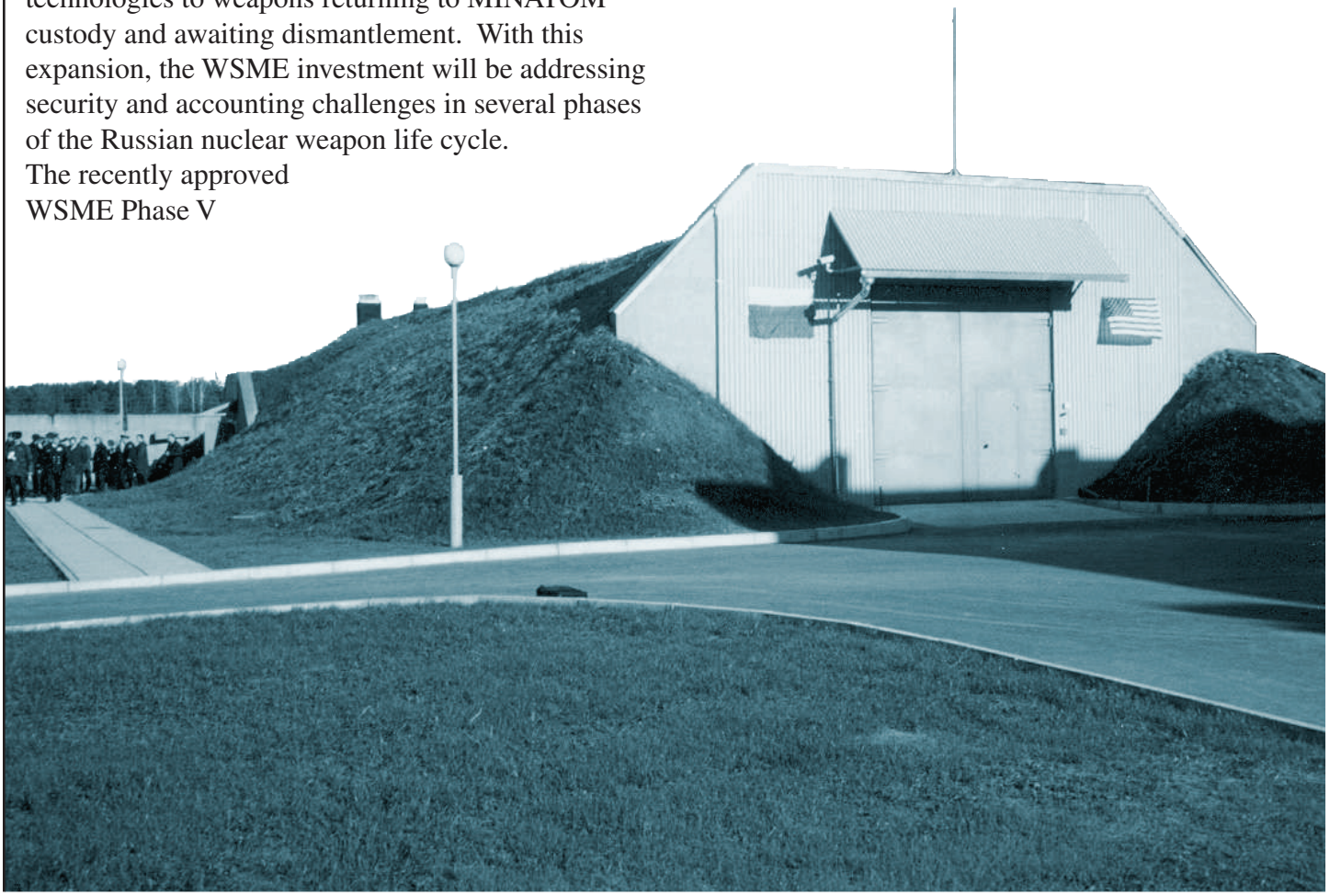
Leveraging through WSME continued on page 15

Leveraging through WSME continued from page 14

BTS facility near Saint Petersburg. This facility realistically replicates the operational environment for nuclear warhead maintenance and storage at MOD sites. Testing of the AMIS will commence in fiscal year 2004 and will include evaluations of monitoring technologies in normal operational and storage environments, extreme environmental conditions, accident environments, and rule-violation (theft) environments.

A proposed second-generation spin-off project from the WSME effort is informally referred to as the Sister of TOBOS. This new initiative between MINATOM and DOE will involve Sandia partnering with the All-Russia Scientific Research Institute of Technical Physics (VNIITF) in the operational test and evaluation of accounting and security systems for nuclear assets during the MINATOM portion of the life cycle. This project will examine the continuity and balanced application of the AMIS technologies to weapons returning to MINATOM custody and awaiting dismantlement. With this expansion, the WSME investment will be addressing security and accounting challenges in several phases of the Russian nuclear weapon life cycle.

The recently approved WSME Phase V initiative is a three-year research, development, testing, and evaluation effort that extends the work already accomplished in the first four WSME phases. Phase V will include not only further advancements in monitoring technologies for storage and transportation, but will also include side-by-side comparisons of various US and Russian monitoring technologies and procedures. The side-by-side comparisons will be conducted at Sandia and at VNIIA. In addition to the comparative testing of each system, one of the major anticipated outcomes of this effort will be common insight into security requirements for storing and transporting nuclear warheads and unique approaches to developing frameworks for reducing the vulnerabilities of a weapon as it moves through the life cycle. Source: Greg Mann 6927, MS 1374, 505-844-6795, fax 505-844-8119, gremann@sandia.gov



Lab-to-Lab Collaboration Revitalized

Since the fall of the Soviet Union, the US government has had continuing interest in establishing and strengthening ties between US nuclear weapons laboratories and Russia nuclear weapons institutes. The first significant interactions between US national laboratories and Russian scientific research institutes occurred under the direction of Admiral Watson at the US Department of Energy (DOE) in late 1991. Over the next 12 years, a number of formal agreements have been put in place to enable effective interaction in a variety of safety, technology, and science arenas. However, direct laboratory-to-laboratory interactions, unencumbered by a large government bureaucracy yet furthering the US and RF governments' national security goals, remain one of the more effective vehicles of collaboration. The level of such interactions has fluctuated over the years, responding to differing government priorities, political situations, and priorities of the nuclear establishments. The program described here represents an effort to revitalize lab-to-lab exchanges.

An April 2002 meeting between US and Russian nuclear institute directors and representatives of DOE's National Nuclear Security Administration (NNSA) and Russia's Ministry of Atomic Energy (MINATOM) resulted in commitments by John Gordon, NNSA administrator, and First Deputy Minister L. D. Ryabev of MINATOM to implement an enhanced program of collaboration between US laboratories and Russian institutes. An exchange of letters outlined the rationale for the collaboration and established the operating parameters and technical areas to be explored. Since this exchange of letters, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories have cooperated to identify appropriate projects to undertake in this collaboration. In 2003, Gordon's and Ryabev's successors, Linton Brooks and Igor Borovkov,

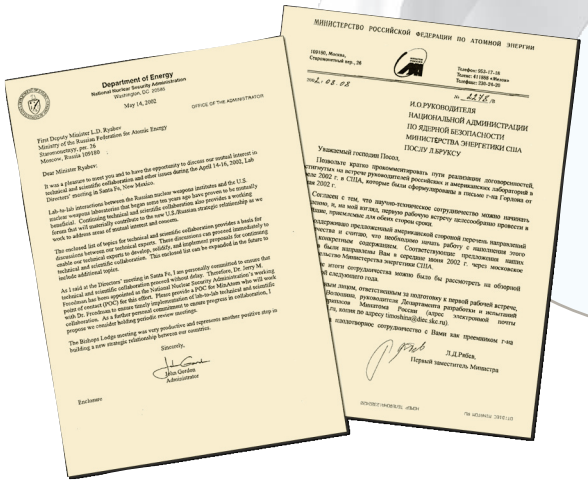
Lab-to-Lab continued on page 17

NNSA and MINATOM letter exchanges support enhanced science and technology collaboration.

May 14, 2002: To L. D. Ryabev, First Deputy Minister, MINATOM

"…Lab-to-Lab interactions between the Russian nuclear weapons initiatives and the US nuclear weapons laboratories that began some ten years ago have proven to be mutually beneficial. Continuing technical and scientific collaboration also provides a working forum that will materially contribute to the new US/Russian strategic relationship as we work to address areas of mutual interest and concern…I am personally committed to ensure that technical and scientific collaboration proceed without delay…"

John Gordon, Administrator
NNSA


Department of Energy
National Nuclear Security Administration
Washington, DC 20585

May 14, 2002

OFFICE OF THE ADMINISTRATOR

First Deputy Minister L.D. Ryabev
Ministry of the Russian Federation for Atomic Energy
Staromonetnyy per., 26
Moscow, Russia 109180

Dear Minister Ryabev:

It was a pleasure to meet you and to have the opportunity to discuss our mutual interest in technical and scientific collaboration and other issues during the April 14-16, 2002, Lab Directors' meeting in Santa Fe, New Mexico.

Lab-to-lab interactions between the Russian nuclear weapons institutes and the U.S. nuclear weapons laboratories that began some ten years ago have proven to be mutually beneficial. Continuing technical and scientific collaboration also provides a working forum that will materially contribute to the new U.S./Russian strategic relationship as we work to address areas of mutual interest and concern.

The enclosed list of topics for technical and scientific collaboration provides a basis for discussions between our technical experts. These discussions can proceed immediately to enable our technical experts to develop, solidify, and implement proposals for consideration at additional topics.

As I told at the Directors' meeting in Santa Fe, I am personally committed to ensure that technical and scientific collaboration proceed without delay. Therefore, Dr. Jerry M. Peterson has been appointed as the National Nuclear Security Administration's working point of contact (POC) for this effort. Please provide a POC for MINATOM who will work with Dr. Peterson to ensure timely implementation of lab-to-lab technical and scientific collaborations. As a further personal commitment to ensure progress in collaboration, I propose we consider holding periodic in-person meetings.

The Bishops Lodge meeting was very productive and represents another positive step in building a new strategic relationship between our countries.

Sincerely,

John Gordon
Administrator

Enclosure

МИНИСТЕРСТВО РОССИЙСКОЙ ФЕДЕРАЦИИ ПО АТОМНОЙ ЭНЕРГИИ

109180, Москва,
Старомонетный пер., 26

Телефон: 953-37-38
Телекс: 411068 «Минатом»
Телефакс: 230-24-20

[illegible]. 08.02

№ 4276/8

И.О.РУКОВОДИТЕЛЯ
НАЦИОНАЛЬНОЙ АДМИНИСТРАЦИИ
ПО ЯДЕРНОЙ БЕЗОПАСНОСТИ
МИНИСТЕРСТВА ЭНЕРГЕТИКИ США
ПОСЛУ Д.ФРУКСУ

Уважаемый господин Посол,

Позвольте кратко прокомментировать пути реализации договоренностей, достигнутых нами встрече руководителей российских и американских лабораторий в [illegible] 2002 г. в США, которые были сформулированы в письме г-на Гергеля от [illegible] 2002 г.

Согласен с тем, что научно-техническое сотрудничество можно начинать немедленно, и, на мой взгляд, первую рабочую встречу целесообразно провести в ближайшее время, причем для обеих сторон сроки.

Поддерживаю предложенный американской стороной перечень направлений конкретное содержание. Соответственно, предложения экспертов были направлены Вам в середине июня 2002 г. через посольство Министерства энергетики США.

В итоге сотрудничества можно было бы рассмотреть на обзорной [illegible] следующего года.

Тем лицам, ответственным за подготовку к первой рабочей встрече, [illegible] руководителем Департамента разработки и испытаний [illegible] Минатома России (адрес электронной почты [illegible]@dfec.ikc.ru).

[illegible] сотрудничество с Вами как прежними г-ном [illegible]

Л.Д.Рябев,
Первый заместитель Министра

August 8, 2002: To Ambassador Linton Brooks, Acting Administrator, NNSA

"…I concur that our scientific and technical cooperation can be started immediately…I support the list of cooperation areas suggested by the US side and believe that the effort should begin with filling this list by specific contents…"

L. D. Ryabev, First Deputy Minister
MINATOM

Lab-toLab continued from page 16

renewed the pledge to collaborate through a second exchange of letters.

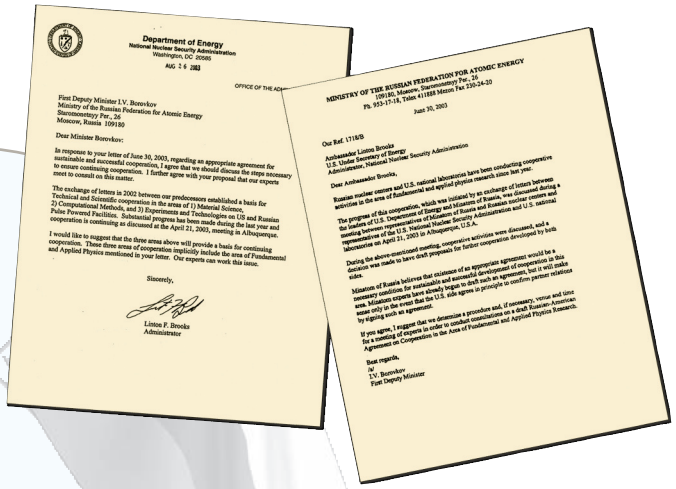
This lab-to-lab effort is not a grants program but a true collaboration, which must provide benefits to each side. The record of meeting for the April 2002 Lab Director's meeting states that projects "must be under the general area of stockpile stewardship and must fit under the NNSA Defense Programs campaign structure." Potential collaborative Sandia projects are developed in coordination with cognizant Russian researchers, funded through a variety of line organizations, and directly benefit a current Defense Programs campaign. Note that no separate funding is allocated for these projects; project funding is taken from existing line organization budgets. As noted in the letter from Gordon to Ryabev, all projects must fall under one of three general areas: Material Science, Computational Methods, or Experiments and Technologies on US and Russian Pulsed Power Facilities. While much of the work is concentrated at the three major Russian weapons labs, other Russian labs and institutes are involved when their expertise is appropriate.
Sandia has begun work in all three technical areas of the lab-to-lab program, as illustrated in the sidebars to this article. Almost all the projects begun in 2003 will extend for several more years; in addition, other promising technical areas are under exploration.

Source: Jim Arzigian 5327, MS 1374, 505-844-2747, fax 505-844-8119, jsarzig@sandia.gov

June 30, 2003: To Ambassador Linton Brooks, Administrator, NNSA

"Russian nuclear centers and US national laboratories have been conducting cooperative activities in the area of fundamental and applied physics research since last year…which was initiated by an exchange of letters between the leaders of US Department of Energy and MINATOM of Russia…existence of an appropriate agreement would be a necessary condition for sustainable and successful development of cooperation in this area…"

I. V. Borovkov, First Deputy Minister
MINATOM



Department of Energy
National Nuclear Security Administration
Washington, DC 20585

AUG 26 2003

First Deputy Minister I.V. Borovkov
Ministry of the Russian Federation for Atomic Energy
Staromonetnyy Per., 26
Moscow, Russia 109180

Dear Minister Borovkov:

In response to your letter of June 30, 2003, regarding an appropriate agreement for sustainable and successful cooperation, I agree that we should discuss the steps necessary to ensure continuing cooperation. I further agree with your proposal that our experts meet to consult on this matter.

The exchange of letters in 2002 between our predecessors established a basis for Technical and Scientific cooperation in the areas of 1) Material Science, 2) Computational Methods, and 3) Experiments and Technologies on US and Russian Pulse Powered Facilities. Substantial progress has been made during the last year and cooperation is continuing as discussed at the April 21, 2003, meeting in Albuquerque.

I would like to suggest that the three areas above will provide a basis for continuing cooperation. These three areas of cooperation implicitly include the area of Fundamental and Applied Physics mentioned in your letter. Our experts can work this issue.

Sincerely,

Linton F. Brooks
Administrator

MINISTRY OF THE RUSSIAN FEDERATION FOR ATOMIC ENERGY
109180, Moscow, Staromonetnyy Per., 26
Ph. 953-17-18, Telex #11888 Mezon Fax 230-24-20

June 30, 2003

Our Ref. 1718/B

Ambassador Linton Brooks
U.S. Under Secretary of Energy
Administrator, National Nuclear Security Administration

Dear Ambassador Brooks,

Russian nuclear centers and U.S. national laboratories have been conducting cooperative activities in the area of fundamental and applied physics research since last year.

The progress of this cooperation, which was initiated by an exchange of letters between the leaders of U.S. Department of Energy and Ministry of Russia, was discussed during a meeting between representatives of Ministry of Russia and Russian nuclear centers and representatives of the U.S. Department of Energy National Security Administration and U.S. national laboratories on April 21, 2003 in Albuquerque, U.S.A.

During the above-mentioned meeting, cooperative activities were discussed, and a decision was made to have draft proposals for further cooperation developed by both sides.

Ministry of Russia believes that existence of an appropriate agreement would be a necessary condition for sustainable and successful development of cooperation in this area. Ministry experts have already begun work on such an agreement, but it will make some clarifications in the event that for U.S. side agrees in principle to confirm partner relations by signing such an agreement.

If you agree, I suggest that we determine a procedure and, if necessary, venue and time for a meeting of experts in order to conduct consultations on a draft Russian-American Agreement on Cooperation in the Area of Fundamental and Applied Physics Research.

Best regards,

/s/
I.V. Borovkov
First Deputy Minister

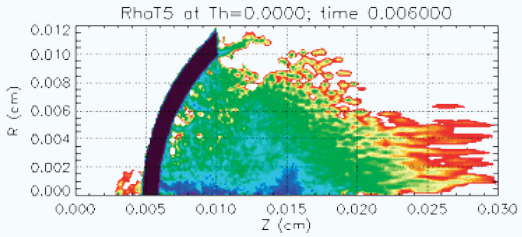
August 26, 2003: To I.V. Borovkov, First Deputy Minister, MINATOM

"…I agree that we should discuss the steps necessary to ensure continuing cooperation. The exchange of letters in 2002 between our predecessors established a basis for Technical and Scientific cooperation in the areas of 1) Material Science, 2) Computational Methods, and 3) Experiments and Technologies on US and Russian Pulse Powered Facilities…the three areas will provide a basis for continuing cooperation…"

Linton F. Brooks, Administrator
NNSA

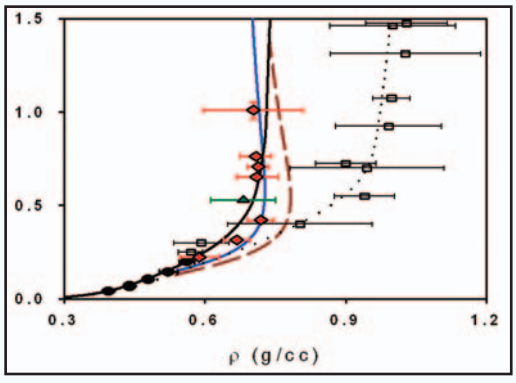
Computational Methods
Development of an Algorithm for Simulating PW Laser Interactions with Dense Matter

Sandia National Laboratories and VNIITF have joined forces to develop algorithms for adaptive mesh refinement techniques and their application to the simulation of the interaction of short-pulse petawatt (PW) lasers with dense matter. The algorithm code will provide relevant physical models for the interaction of PW lasers with dense matter and the generation and transport of both fast electrons and fast ions. These models will be compared with codes developed at Sandia and at Mission Research Corporation. The current collaboration will generate a detailed program plan for collisional hybrid plasma physics algorithm development, resulting in a list of physics capabilities, mathematical formulations, and numerical algorithms that will be incorporated into a VNIITF Monte-Carlo/Fokker-Planck code and an estimated schedule for a phased release of these capabilities. For Sandia the research lays a foundation for possible fast igniter research on a combination of the refurbished Z accelerator (ZR) and Z-Beamlet Petawatt (ZBL-PW) laser, and for VNIITF the research develops a state-of-the-art modeling capability relevant to an area of international interest. Source: Tom Mehlhorn 1674, MS 1186, 505-845-7266, fax 505-845-7820, tamehlh@sandia.gov



Log of proton density accelerated from the rear side of a thin foil by electric fields generated by petawatt laser irradiation of the front surface.

Material Sciences and Pulsed Power
Deuterium Equation of State



Stress volume compression for deuterium

Sandia and VNIIEF are partnering to develop an independent test methodology that will yield the true equation of state (EOS) for deuterium in the pressure range of 1 to 3 Mbar under isentropic compression. This newly undertaken project is expected to span more than three years. Sufficient controversy exists in the published experimental and theoretical equation of state for deuterium to suggest using an independent technique to resolve and validate the true EOS for the material. The project will include design and testing of the experimental configuration for generating the experimental data, including x-ray imaging diagnostics, toward the ultimate development of an EOS for hydrogen and deuterium.
Source: Lalit Chhabildas 1647, MS 1181, 505-844-4147, fax 505-845-7685, lcchhab@sandia.gov

ASC Provides Alternative Approaches to Difficult Problems

A portion of Sandia's commitment to lab-to-lab collaborations is supported by the Advanced Simulation and Computing (ASC) Program. The goal of ASC is to deliver physics-based simulation capabilities, and central to this goal is an understanding of the underpinning physics, including experimental discovery, theoretical models, and numerical algorithms. Collaborations between ASC and the Russian nuclear institutes are off to an excellent start with the 2003 signing of four contracts in computational algorithms for Z-pinch applications and expectations for additional contracts in materials science and computational sciences to be negotiated and started in 2004. The Russian institutes' high-quality technical staff and experimental facilities provide opportunities for Sandia's engineers and scientists to access unique analytical, simulation, and experimental methods at the Russian institutes. Source: Robert K. Thomas 9904, MS 0139, 505-844-7450, fax 505-844-5970, rkthoma@sandia.gov

Pulsed Power
Mega-Ampere Plasma Opening Switch

As part of a multiyear effort in pulsed-power component development, Sandia National Laboratories and VNIIEF have partnered to create and test a mega-ampere plasma opening switch (POS), leading to evaluation of POS technology as the primary building block of a 60-MA driver for z-pinch fusion. Sandia will use this work to evaluate alternative technologies for development of the next high-current accelerator in the US Source: Ken Struve 1644, MS 1194, 505-845-7483, fax 505-845-7864, kwstruv@sandia.gov

SNL representatives with VNIIEF partners, March 2003

Collaboration Across Oceans

TOBOS Test Facility in Moscow, Russia

Joan Woodard
Executive Vice President and Deputy Director
Sandia National Laboratories

In October 2003, Dori Ellis, Director of International Security Programs, and I were privileged to accompany Major General Trudy Clark, Deputy Director of the Defense Threat Reduction Agency (DTRA) to Russia to commemorate a significant milestone in US and Russian collaboration. At a Russian Ministry of Defense nuclear warhead security systems institute, we participated in a ceremony with Russian and US participants to recognize the significance of a newly constructed test facility and to kick off the first phase of testing for advanced warhead security monitoring concepts, known as the TOBOS project.

Much has happened since the days when the United States and the former Soviet Union were engaged in a fierce arms race, and today the cooperation between our two nations leads us in a common direction to secure the world from threats of terrorism and weapons of mass destruction. Gone are the days of increasing our weapon stockpiles. Our treaties and agreements are guiding us in reducing them. While this process will be long and arduous, the peaceful cooperation between our two great nations will have a positive influence on the rest of the world.

Our Russian collaborators have shown great support for and dedication to the TOBOS Project. The TOBOS test facility and the excellent work that will be conducted there are clear signs of the growing collaboration between our countries, our ministries of defense and energy, and our national laboratories. When our countries initiated the Warhead Safety and Security Exchange in 1995, the intent was to challenge the best minds from the ministries and laboratories to work together to make our world more secure. The TOBOS program is the best example of that collaboration.

Sandia National Laboratories is proud to have been able to play a part in the TOBOS program from the outset. We are even more proud, however, to be associated with our outstanding collaborators. I would like to acknowledge some of the visionary leaders at our partnering organizations:

- The US Defense Threat Reduction Agency/Technology Development Directorate, our sponsor responsible for initiating and implementing such important work: Dr. Tom Hopkins, LTC Tom Cartledge, LTC Ray Deegan, Lt Col Tom Dunham, and Major Don Opperman

- Russia's Ministry of Defense, playing the essential role of ensuring that the TOBOS project adds true value to operational safety and security: General Starodubtsev, Colonel Smirnov, Rear Admiral Pertsev, and Captain 1st Rank Devochkin

- VNIIA, our sister laboratory, with whom we have had a close and successful partnership for over 10 years: Chief Designer Dr. German Smirnov, Dr. Andrey Sviridov, and Dr. Konstantin Zimovets

This TOBOS Test Facility demonstrates our dedication to supporting each other but also and more importantly

***Collaboration Across Oceans* continued on page 21**

Collaboration Across Oceans ***continued from page 20***

will lead to future technologies that will help secure very dangerous items. The TOBOS project truly meets the DTRA vision: "Making the world safer by reducing the threat of weapons of mass destruction."

Dr. Joan Woodard joined Sandia as a researcher in 1974, has worked in the national security and weapons programs of the labs, and has served as Director of the Environmental Programs Center. Prior to her current appointment, Woodard was Vice President of the Energy, Information, and Infrastructure Technology Division. Woodard serves on external panels and boards, including the Secretary of Energy's Nuclear Energy Research Advisory Council, the Congressional Commission to Assess the Threat from High Altitude Electromagnetic Pulse, the Defense Science Board summer study on Homeland Security, the Intelligence Science Board, and the Army Science Board summer study on Force Protection. Woodard has received many honors including the Upward Mobility Award of the Society of Women Engineers and an Alumni Achievement Award from the University of Missouri and has been named by the Albuquerque Journal as "One of Twenty Women to Watch in the New Millennium."

Acronyms

AMIS	Advanced Monitoring and Inventory System
ASC	Advanced Simulation and Computing
CTR	Cooperative Threat Reduction
DHS	Department of Homeland Security (US)
DOD	Department of Defense (US)
DOE	Department of Energy (US)
EOS	equation of state
FAAE	Federal Agency of Atomic Energy (Russia)
FL	Florida
FSU	former Soviet Union
GOST	Gosstandart [State Committee of the Russian Federation for Standardization and Metrology, the Russian Equivalent of the American National Standards Institute (ANSI)]
HE	high explosives
HEU	highly enriched uranium
IAEA	International Atomic Energy Agency (Vienna, Austria)
INMM	Institute of Nuclear Materials Management
INSP	International Nuclear Safety Program
ISP	International Security Programs (SNL)
LANL	Los Alamos National Laboratory (US)
LLNL	Lawrence Livermore National Laboratory (US)
MINATOM	Ministry of Atomic Energy (Russia)
MOD	Ministry of Defense (Russia)
MPC&A	Material Protection, Control, and Accounting
NA-10	Defense Programs (DOE/NNSA)
NA-241	Office of Nonproliferation Policy (DOE/NNSA)
NITs/BTS	Weapon Safety and Security Research Technology Center (Russian Acronym)
NM	New Mexico
NNSA	National Nuclear Security Administration (DOE)
USA PATRIOT	Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (Act, US legislation 2001)
POS	plasma opening switch
PW	petawatt
R&D	research and development
RDD	radiological dispersion device
SNL	Sandia National Laboratories (US)
SOAE	Strategic Offensive Arms Elimination
SSBN	Navy designator for its ballistic missile launching nuclear submarine
STDF	Storage Technology Demonstration Facility (Moscow, Russia)
TOBOS	Safety and Security Technologies for Russian Warheads (Russian acronym)
VNIIA	All-Russia Scientific Research Institute of Automatics (Moscow, Russia)
VNIIEF	All-Russia Scientific Research Institute of Experimental Physics (Sarov, Russia)
VNIITF	All-Russia Scientific Research Institute of Technical Physics (Snezhinsk, Russia)
WSME	Warhead Storage Monitoring Experiment
WSSX	Warhead Safety and Security Exchange
ZBL-PW	Z-Beamlet Petawatt laser
ZR	Z accelerator

International Security Center Hosts Biosecurity Symposium

One of the missions of Sandia National Laboratories' International Security Center is to improve US national security by working cooperatively with foreign governments to secure nuclear, biological, and chemical materials worldwide. February 1 through 6, 2004, the center hosted the International Symposium on Securing High Consequence Pathogens and Toxins, which was sponsored by the NNSA Office of Nonproliferation Policy (NA-241). More than 60 scientists from bioscience research laboratories around the world gathered at the Cooperative Monitoring Center in Albuquerque to discuss keeping dangerous pathogens and toxins out of the hands of terrorists.

The purpose of the symposium was to share information and begin a dialogue with operators of US and foreign laboratories conducting infectious disease research. The symposium had three broad goals: 1) to establish the context of biosecurity within the larger framework of biological weapons nonproliferation and biodefense, 2) to present the United States' experiences in implementing biosecurity, and 3) to glean from the international audience their concerns, interpretations, and definitions of biosecurity.

Although most bioscience labs have systems in place to prevent people from being accidentally exposed to infectious diseases, no international guidelines exist that specify how labs should prevent malicious theft or sabotage of biological materials.

Presentations delivered during the symposium were interspersed with targeted discussions that confirmed the need for follow-up regional workshops on biosecurity and corroborated an international desire for a specific set of international biosecurity guidelines. In one session, presenters from a variety of governmental and nongovernmental institutions discussed a broad spectrum of biological weapons-related issues. Another session was dedicated to international biosecurity presentations followed by a panel discussion. An afternoon of poster presentations focused on counter-biological weapons technologies.

Sandia's biosecurity team shared its experience in designing and implementing biosecurity systems. Sandia recognizes that the implementation of biosecurity in the United States will differ from the implementation of biosecurity in other countries. Therefore, these presentations served to provide a reference point from which to begin an international biosecurity discussion.

Sandia is playing a leading role in the relatively new field of biosecurity. Since the September 11, 2001, terrorist attacks and the anthrax attacks of 2001, the US government has invested in various measures to improve the country's ability to respond to bioterrorism. New vaccines, therapies, sensors, disease-tracking systems, and improved public health infrastructures have been developed. The

Biosecurity Symposium **continued on page 23**

Calendar: Visits, Workshops, and Conferences

May 4-5 Albuquerque, NM: *Sandia hosts Noetic, abl Solutions Limited, and the US Air Force in the International Programs Building for a kick-off meeting on logistics and testing parameters for a new acoustic fiber-optic system. (NA-241) Alan Runyan-Beebe 6923, 505-844-6833 and Timothy Crawford 6924, 505-844-2949*

May 8-15 Albuquerque, NM: *Sandia hosts VNIITF representatives from Russia in the International Programs Building for demonstrations and discussions regarding advanced Russian tags and seals. (NA-241) Joe Saloio 6927, 505-845-3067*

May 17-18 Moscow, Russia: *VNIIA hosts FAEA, VNIIEF, VNIITF, NNSA, LANL, LLNL, and SNL for Lab Directors' biennial meeting. (Corporate Overhead) Dori Ellis 6900, 505-845-3077*

May 27 Albuquerque, NM: *Sandia hosts the Ploughshares foundation and other members of the Peace and Security Funders Group, which supports international peace and security initiatives, to discuss Sandia international programs. (NA-241; foundation support) Kent Biringer 6924, 505-284-5048*

July 3-17 Albuquerque, NM: *Sandia hosts VNIIA WSME experts in the International Programs Building to discuss and plan future collaborations associated with the WSSX Safe and Secure Monitoring Technologies project. (NA-241) Joe Saloio 6927, 505-845-3067 and Lada Osokina 6927, 505-845-0632*

July 18-22 Orlando, FL: *The 45th Annual Meeting of the Institute of Nuclear Materials Management. www.inmm.org; John Matter 6923, INMM President, 505-845-8103*

July 17-28 Orlando, FL, *and Albuquerque, NM: Sandia hosts VNIIEF representatives from Russia in Orlando for the annual INMM meeting and in Albuquerque at the International Programs Building for a technical exchange regarding monitoring systems for weapon material storage. (NA-241) Joe Saloio 6927, 505-845-3067*

September 20-24 Berlin, Germany: *The German Federal Institute for Materials Research and Testing in cooperation with IAEA and INMM hosts the 14th International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM 2004). www.patram2004.com; Ken Sorenson 6141, 505-844-0074*

Biosecurity Symposium ***continued from page 22***

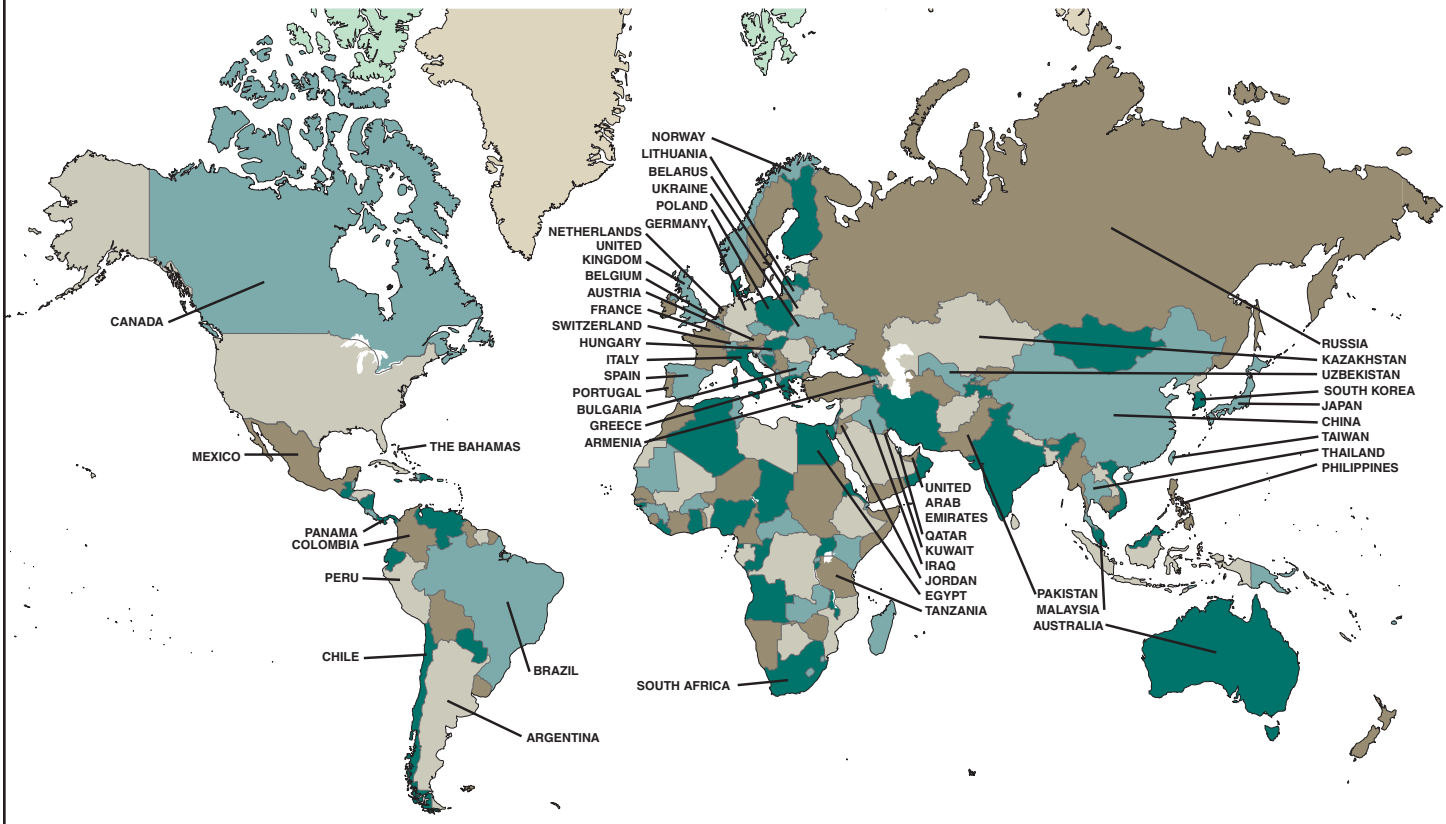
objective of biosecurity, now federally mandated for US bioscience laboratories, is to keep terrorists from obtaining the material necessary to make a biological weapon. Sandia's security experts are recommending that biosecurity standards be adopted worldwide and that these standards be considered as national implementation measures for the Biological Weapons Convention. Source: Ren Salerno 6928, MS 1374, 505-844-8971, fax 505-284-5055, rmsaler@sandia.gov; "World's Bioscience Experts Discuss Securing Pathogens," by John German, Sandia Lab News, Vol. 56, No. 3, February 6, 2004, page 2.

Conference technical host Ren Salerno (left) discusses biosecurity issues with Won Keun Seong of the Republic of Korea's Research Center for Pathogen Control. (Photo by Bill Doty)

(facing page) **Several symposium participants** pause for a photo:

From left to right: Bambang Soebagyo of Indonesia, Fransiscus Xaverius Suharyanto Halim of Indonesia, Roslan bin Abd Aziz of Malaysia, Lauren Hickok of the Sandia biosecurity team, Anne Kusmayati of Indonesia, Daniel Estes of the Sandia biosecurity team, Jennifer Gaudioso of the Sandia biosecurity team, Zulkifli bin Ahmad of Malaysia, Pericles Palha de Oliveira of Brazil, and Ganga Prasad Rai of India.

ISP Personnel On the Move



The projects undertaken by International Security Programs (ISP) personnel often necessitate international travel to places exotic and, sometimes, not so exotic. Foreign travel by ISP personnel in 2003 involved 732 trips, a 50 percent increase over the 480 trips in 2002. International travel rates in 2004 suggest that the number will meet or surpass 2003. Several continents are frequently visited as we execute projects in South Asia, Northeast Asia, Central Asia, Middle East, Caucasus, Russia, Australia, Europe, Australia, and South America. Forty percent of the 2004 travelers have visited Russia and the other countries of the former Soviet Union, reflecting the continued strategic importance of the programs in those countries. The map above indicates the places that ISP personnel have visited or plan to visit in 2004. Source: Patricia Dickens 6929, MS 1371, 505-284-5033, fax 505-284-5030, pdicken@sandia.gov

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